

SCIENCE.

FRIDAY, SEPTEMBER 18, 1885.

WHO SHOULD BE SUPERINTENDENT OF THE UNITED-STATES COAST-SURVEY.

THE course to be followed at Washington in the selection of a superintendent of the U. S. coast-survey, will be watched with the greatest concern by all who are interested in the conduct of that important bureau. Those especially who believe in maintaining the civil service in a high state of efficiency, and who look to the present administration for the faithful application of sound principles in the selection of officials for positions of high responsibility, will form their opinion of the wisdom and honesty of those in authority by the action which is about to be taken.

We are informed that actually an appointment has already been made; but we take it for granted that it is only an appointment *ad interim*, that the public service may not suffer any detriment in the emergency which has arisen. In all probability, the officer now in charge of the survey, however qualified he may be to pronounce upon many of the questions which are brought to his notice,—and we hear him spoken of in terms of great respect,—would decline the responsibility of guiding, even for a few months, the work of a scientific corps so numerous, so expert, and so special, as the surveyors and hydrographers of our coast.

The head of the survey must not only be competent to judge of results, as does the secretary of the treasury, or the observing member of congress, but he must be competent to point out the methods, and select the agents, and govern the various steps, by which the desired results are to be obtained. As these results—the accurate description of the coast, and the careful observation of the changes which are constantly in progress upon the marine highways of travel and commerce

—depend upon the most precise physical measurements, and the most accurate mathematical discussions, the superintendent should be a man who has been trained in mathematical and physical science. Other qualities are also essential, but they can be found in men who have been trained to this particular kind of scientific work.

If there should be a vacancy in the supreme court, none but a lawyer would be thought of for the position; if there should be need of a surgeon-general for the army or the navy, none but a physician would be appointed; only a military engineer would be competent to conduct the military engineering of the government. What is true of the older professions is true of the newer. The director of the coast and geodetic surveys of this vast country should be one who will command the professional confidence and respect of all who are themselves expert in hydrography and geodesy. He must be surveyor-in-chief, or surveyor-general. He should have high personal character, acquaintance with the structure and physics of the globe, skill in administration, and the power of complete and lifelong devotion to a work of great responsibility and honor.

It is not necessary to look for such a man in the army or in the navy. Indeed, there are grave objections to detailing any officer of either arm of the service to the conduct of the coast-survey; and it may be assumed, that no one will resign from the army or navy to enter upon the unpensioned and uncertain career of a civilian. Fortunately, there are several men in civil life whose pursuits and attainments qualify them for the superintendency,—men who have already won distinction in mathematical and physical researches. Among them are men of excellent business habits, of administrative skill, of honest, faithful, and industrious lives. Upon such a man we sincerely hope the choice will fall.

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

The study of logic in the scientific schools.

THAT logic should be thoroughly studied in our scientific schools is a thesis which we support most strenuously, but, so far as we know, without the indorsement of any of the faculties of those schools. At all events, such courses of study in scientific schools as have come to our notice, make no provision whatsoever for the study of logical science.

The reason for this is, perhaps, indifference on the part of the faculties; but we think it more likely to be the crowded condition of the scientific curriculum. That the last mentioned is a legitimate excuse, may be seen from the fact that our scientific schools are continually raising the standard of the entrance examinations, so putting as much work as possible into the preparatory years. A glance at the catalogue of any first-class institution will show this, as well as that the four years of the course are even now fully occupied. In the School of mines of Columbia college, for instance, a student of the second-year class must pursue fourteen or fifteen subjects; and five hours of attendance are the average number required of him each day. With the students of the third and fourth year classes the case is the same. Even if members of the first-year class had the time, they are too immature, and not sufficiently advanced, to gain the desired benefit from logical study.

Of course there can be no two opinions as to the feasibility of adding logic to such a curriculum as this. There is absolutely no time for it.

Our point is, that logic should have time made for it, and for two main reasons. First, because of its importance to the intellectual culture of the student; and, secondly, because of its importance to the value of any subsequent thought and investigation. As an intellectual gymnastic, logic, when properly apprehended and taught, is superior even to mathematics, and capable of far more general and varied application. The truth of this statement does not depend upon the dogma of any of the much-despised class of 'mediaeval metaphysicians,' but numbers among its defenders men of the intellectual stamp of Jevons and John Stuart Mill.

But this is not the main support of our present argument. We prefer to lay more stress upon the second specification; namely, the great importance of a logical training for the value of any scientific work.

As a matter of course, we do not mean by logic any dry rattling of syllogistic bones, important as a knowledge of the syllogistic process and rules certainly is. But we have in mind such a treatment of the great philosophical organon as will introduce our scientific students to the elements of a theory of knowledge, teach them the nature and relations of the mental processes involved in a train of reasoning or proof, investigate with them the nature, limits, and canons of hypothesis and inductive inquiry, and discuss the nature of evidence, and the theories of proof and probability. All of these subjects should be familiar ground to every man of science, young or old. His work should be along the lines laid down by a correct logic, and his conclusions conformable to its canons. The logical writings of Herschel, Whewell, and Mill offer innumerable examples of the value of strictly logical processes applied to scientific investigation; and our common sense must assuredly emphasize their testimony.

The truth is that many an absurd deduction, many a false inference, would be avoided, were the investigator in possession of some knowledge of elementary logic. To say that men have reasoned and do reason correctly without logic, is no answer. So do children count marbles correctly while yet in ignorance of the rule for long division and the multiplication table. Not only does logic aid and clarify men's reasoning, and give it a defensible foundation to stand on, but it is the instrument for the detection and explanation of fallacies and false steps in scientific investigations by whomsoever they are made.

Other and cogent reasons for the acceptance of our thesis could be easily urged. But those just briefly stated seem to us sufficient at this time and place.

The instruction we plead for need not be elaborate. It need not be on the same scale as that desired by a specialist in mental science. A competent instructor could probably make two hours a week for a half-year suffice for what we have sketched above as desirable. And to secure the benefits that would arise from that instruction, we claim that any faculty in the land should gladly rearrange its course of study.

NICHOLAS MURRAY BUTLER.

Color and other associations.

In 1880, while I was in Washington, I read Mr. F. Galton's note on 'Visualized numerals,' in *Nature* of Jan. 15 of that year.

After I came to Madison, probably late in 1881, or early in 1882, I mentioned my own entire inability to visualize numerals, or any thing else of the kind, to a member of the university faculty, Professor O. I was interested to learn, that, when a boy, he had always conceived the vowel sounds as having color, and that he still retained some traces of this early habit.

I spoke of this subject at my dinner-table shortly after; and my daughter Mildred, then about eight years old, said she also had colors for the days of the week, as follows: Monday, *blue*; Tuesday, *pink*; Wednesday, *brown or gray*; Thursday, *brown or gray*; Friday, *white*; Saturday, *pure white*; Sunday, *black*. It was said laughingly; and at the time it passed to my mind as a joke — that she wished in sport to assume the idiosyncrasies of elder persons. A few days after, I questioned her on these colors; and she gave the same replies. It was again spoken of as a kind of joke and a question of memory, but I wrote the colors down in my memorandum-book for 1882. A year later I produced this, and again questioned her, this time seriously, and found her answers the same as at first. Again, Aug. 5, 1885, her replies were the same. The tenacity of a child's memory is very remarkable; but I was convinced this was not a case of memory and imagination, but a true phenomenon of the kind referred to. I therefore went farther, and asked her if there were any other phenomena of the same kind (she is now eleven and a half years old). I found that each of the letters of the alphabet had a color to her, as follows: —

A, white; B, blue; C, yellow, cream color; D, dark blue; E, red; F, black; G, green; H, white; I, black; J, gray, brown; K, gray; L, dark blue; M, N, brown, not much color; O, yellow; P, green; Q (?) R, brown; S, yellow; T, green; U, yellow; V, white; W, brown; X, Y, not much color; Z, greenish.

The prevalence of yellow and green, and the scarcity of reds and pinks, are noteworthy. I found she knew these colors instantly, and when I asked for them in any order. What is more remarkable, she can instantly name the brown letters in a group, the

black ones, etc. Apparently she does not require to pass the alphabet in review to decide this. The numbers also have colors to her, as follows:—

1, black; 2, cream color; 3, light blue; 4, brown; 5, white; 6, crimson, pink; 7, greenish; 8, white; 9, greenish (?) 10, brown; 11, black; 12, cream color; 13, blue; 14, brown; 15, white: that is, 11 has the same color as 1, 12 as 2, 13 as 3, etc. These colors are also named instantly, and in any order, and in groups.

No other member of my family has this idiosyncrasy. A cousin, Miss S., staying with me, arranges the months in an ellipse, in her mind. The major axis of the ellipse is conceived to be horizontal. March is at the left hand, October at the right, July at the upper extremity of the minor axis, January at the lower. The other months occupy equal spaces between those already named. Hence it follows that their lengths are conceived as unequal. Half the ellipse is occupied by the five months, October to March. The direction of motion round the ellipse is indifferent, left-right or right-left. This ellipse is conceived of as having absolute dimensions. The major axis is taken as about three and a quarter inches. In this connection I would refer to *Science*, July 31 and Aug. 21.

These cases appear to me sufficiently noteworthy to deserve this record in passing.

EDWARD S. HOLDEN.

Madison, Sept 7.

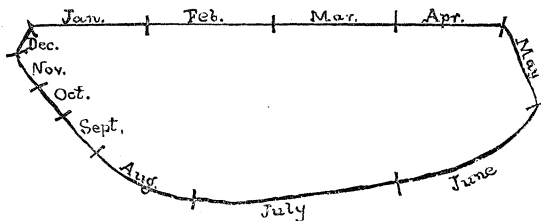
In my mind, there has always been associated with every name or word a color, or shade of color. With some names the color is clear and well defined, with others somewhat vague. I can only distinguish them as light or dark. I give you a few instances: In my mind, John, Jane, Ann, Mary, are red; William, Walter, Robert, blue; George, Nathan, Gilbert, white; Joseph, black; Mark, Judas, Humphrey, brown; James, yellow.

New York, red; Chicago, light; St. Louis, reddish; Portland, dark; San Francisco, yellowish; Leadville, gray; Denver, yellow; St. Paul, dark, etc. I never mentioned this, excepting once or twice when a boy, and was laughed at as trying to say something peculiar.

GEO. S. MILLER.

St. Paul, Minn.

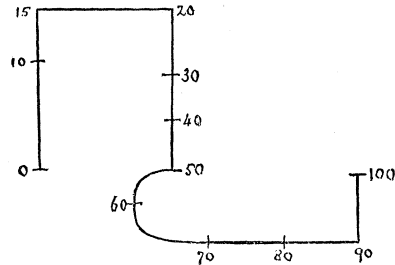
Mr. Ruheit's diagram of the months of the year as pictured in his mind, and as represented in *Science* of Aug. 21, is so strikingly similar to a conception of my own, that I am led to present my diagram also.



The similarity seems very remarkable to me. I cannot explain the *raison d'être* of the diagram. Perhaps, as most boys go through about the same alternations of rest and work during their earlier years, Mr. Ruheit's explanation may apply here, and may also account for the similarity of the diagrams.

A diagram of numbers which also forms itself in

my mind, is of peculiar form, and is equally difficult to explain.



I cannot think of any number less than a hundred, that does not place itself immediately in its appropriate place in the diagram.

ARTHUR WINSLOW.

Raleigh, N.C., Aug. 27.

The ginkgo-tree.

The paper on *Salisburia adiantifolia*, illustrating the 'phylogeny' of the genus Ginkgo, by Lester F. Ward, in *Science* for June 19, is one of great interest to botanists. In the Central Park we have a group of six trees in close proximity to each other, and which bear fruit abundantly. The group is composed of three males and three females, and for the past four years have borne an abundance of fruit. I herewith send you a photograph of a fruiting-branch, which will give an exact idea of how it appears.

E. B. SOUTHWICK,

Botanist and entomologist.

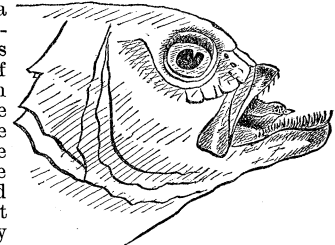
Department of public parks,
Central Park, New York, Aug. 28.

An abnormal black bass.

A black bass, weighing upwards of half a pound, was caught at Webster Lake, Franklin, N.H., Aug. 21, 1885, by Mr. Charles Aiken. The head of this fish presented a singular abnormality, which seemed worthy of a short notice.

The malformation was apparently restricted to the forehead and upper jaw. In other respects, the fish seemed to be normally developed, and in good condition.

The lower jaw was of proper size, and, when the mouth closed, protruded seven millimetres beyond its fellow, exposing the tongue for a length of three millimetres from its tip. This state of things gave the fish a very grotesque appearance, the 'nose' rising quite abruptly to the 'forehead' instead of making with it the customary straight line. The teeth of the lower jaw were entirely exposed, and, not meeting those of the superior maxillary, had become very numerous, and nearly twice their natural size, the exterior curving outward. The vomerine teeth, and those of the upper jaw which met the tongue, were about normal. The exposed parts of the mouth were unduly pigmented;



MICROPTERUS SALMOIDES (LAC.) GILL.
MALFORMED.

also the tongue, which was roughened at the apex, and unusually wide and thick.

A general foreshortening and lateral compression of the bones of the face have taken place, resulting, among other things, in limiting the gape, contracting the palate, and crowding the exterior nares to a position nearer the orbit, and on a line with the superior portion of the pupil. The symmetry of the head is unaltered; and there is no evidence that this condition was due to a wound inflicted by a fish-hook, or otherwise.

Some measurements of the head, taken in straight lines, are as follows:—

	mm.
Depth of head (through centre of pupil and angle of mouth)	51
Angle of mouth to symphysis of inferior maxillary,	27
“ “ “ superior “	23
Pupil “ “ inferior “	35
“ “ “ superior “	25
Width of mouth	24
Distance between orbits	23
Nares from orbit	2
Width of tongue at base	16
Root of tongue to symphysis of inferior maxillary .	16

The accompanying figure is intended to represent in profile the head of this specimen, half life-size, drawn with the mouth open to show better the points in question. A careful dissection would probably show some anatomical facts of interest.

F. H. HERRICK.

The magnetic declination in 1728.

In an official publication lately issued by the U. S. geological survey (Bulletin No. 13, Washington, 1885), we notice an error, which, if not corrected, would do injustice to the memory of the surveyors of 1728, by throwing doubt upon their work on the coast where the state boundary between Virginia and North Carolina intersects it near the head of Currituck Sound, and which reflects injuriously on a chart published by the U. S. coast and geodetic survey.

It is asserted (p. 95) that there is a discrepancy of 6° in the variation of the compass as given by the boundary commissioners, and as inferred from a magnetic chart of the Coast and geodetic survey. We quote from the bulletin: “It is stated in Byrd’s journal, that the variation of the compass was ascertained to be a little less than 3° W. [The magnetic chart of the U. S. coast-survey would make it 3° E.]” We take exception to this last statement. The magnetic chart referred to is published in the Coast and geodetic survey report for 1882, illustrating Appendix No. 13, on the distribution of the magnetic declination in the United States at the epoch 1885, Jan. 1. It gives the declination for the present year 3° 36’ W., and is supported by an observation at the north end of Knott Island in latitude 36° 33.9’, long. 75° 55.3’, which gave in April, 1873, 2° 54.8’ W., and, when reduced to 1885, 3° 38’ W. For the effect of the secular change between 1728 and 1885 we make use of the Baltimore series of observations, Coast and geodetic survey report for 1882, Appendix No. 12, p. 273, and find the declination in 1728 nearly 0.45° smaller or less west than at present: hence it was then nearly 3° W., as closely as can now be computed, and not 3° E. as stated in the bulletin. It is true, that, about 1800, the declination was slightly east; and it was probably overlooked that the needle reversed its motion about that time.

An interesting account of the labors of the surveyors, the hardships they had to endure, and of the anxiety felt for the safety of the party while travers-

ing the Dismal Swamp, is contained in the Westover manuscript by William Byrd [now accessible in print: two copies exist in the Congressional library]. He states that the commissioners of the dividing line found on March 6, 1728, the variation somewhat less than 3° W.; and had any serious error been committed by the surveyors, they could not have helped discovering it.

In connection with the above, the bulletin also states: “But it appears from the operations of the U. S. coast-survey at both ends of the line, that the point of beginning on Currituck Inlet, instead of being, as so constantly assumed, in latitude 36° 30’, or, as determined by the surveyors of 1728, in 36° 31’, is in 36° 33’ 15’.” On this point it may be remarked that the line laid down on Coast chart No. 137A, edition of 1885, in latitude 36° 33’ nearly, rests, not on direct evidence, since no ancient boundary mark was ever discovered, but simply on tradition, and was so laid down on the best information that could be had. The Coast and geodetic survey was never officially called upon either to recover or to rectify this ancient boundary line. It may also be stated that the old Currituck Inlet closed long ago.

C. A. S.

Washington, D.C., Sept. 4.

The Kongo free state.

The account of the Kongo free state in a recent number of *Science* suggested an idea which is, perhaps, not undeserving of some attention. The two principal difficulties in the way of Mr. Stanley’s enterprise, seem to be the climate, which is deadly to white men, and the absence of a civilized population with which to trade. Now, it might be found that both these difficulties would be overcome by colonizing the country with American negroes. They have become re-acclimated on the coast of Liberia, where the climate is fatal to white men; and it is not unfair to assume that the difficulty of acclimatization would be much less in the high regions of the Kongo country. They will bring with them some of the wants of civilized life, thus furnishing a basis for trade. They would, perhaps, furnish the best class of workmen for the projected railway, and form a happy medium of communication between the whites and the natives.

A PATRIOT.

Washington, Sept. 1.

GERMAN UNIVERSITIES FROM A NEW POINT OF VIEW.

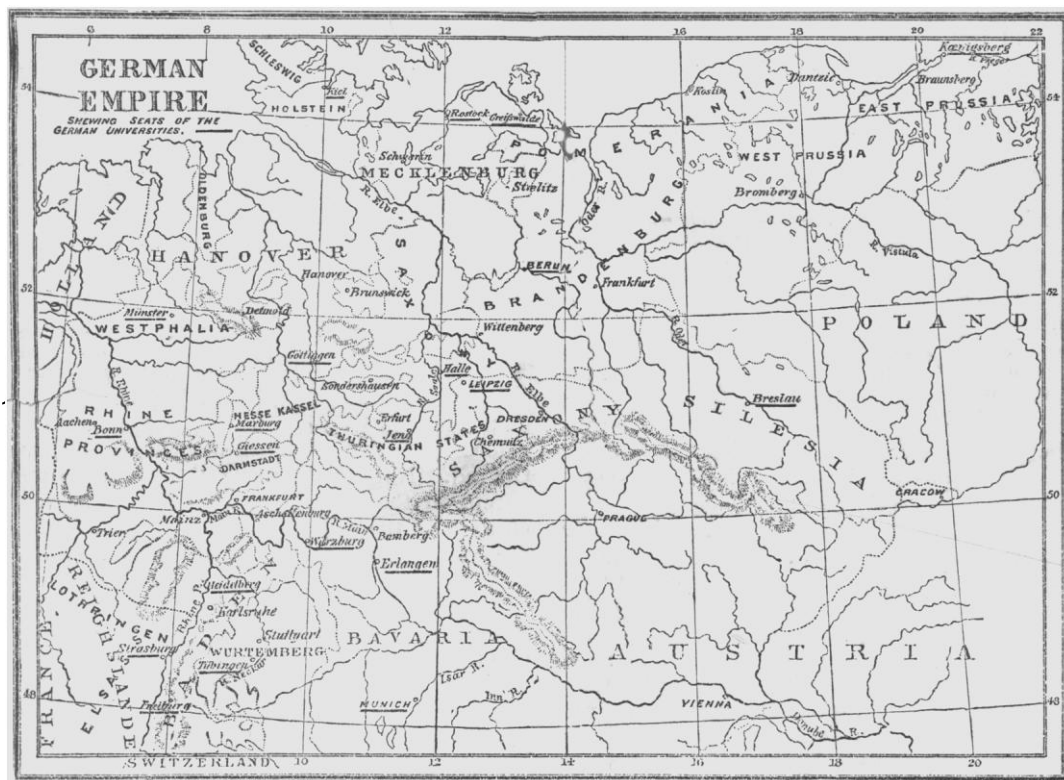
So much has been written about the German universities, — so many histories of separate foundations, so many discussions of academic methods, so many descriptions of student-life, and the like, — that it would seem hardly possible to bring their merits and their limitations before the public in any fresh aspect. Yet a recent writer has done exactly this. He has studied the subject from the point of view of a political economist, or more exactly of a philosophical statistician. That is to say, by a very careful and orderly comparison of the recorded facts of different decades and of different parts of the country, he has thrown such light on the results of an academic system as he might have thrown upon a system

of finance or taxation. He is not one of those students who think that all social movements can be expressed in terms of arithmetic. He is as well aware as any one, that intellectual forces are too recondite to be measured by any calculus; but he knows the value of numbers as well as their inadequacy, and he has used them accordingly in the study of universities with a master's skill.

We refer to the recent work of Dr. J. Conrad of Halle, translated by John Hutchison of Glasgow, and introduced to English read-

ences, so complete in its many-sidedness, and so helpful to those who wish to know the significance and the tendencies of advanced education in the nineteenth century, as that of the great economist of Halle.

Although it is not probable that the United States will ever have a system of universities exactly like that which Germany has established, the German experience will always be of the highest value to Americans. Our historical roots are in England; and our highest educational foundations are likely, hereafter as



MAP SHOWING THE DISTRIBUTION OF GERMAN UNIVERSITIES.

ers by Professor Bryce of Oxford. The translator rightly says of the original, that it is characterized by "that thoroughness for which German research is proverbial," thus reminding us of a remark of Matthew Arnold's, that, as a general rule, "hardly any one amongst us, who knows French and German well, would use an English book of reference when he could get a French or German one." We do not believe that it would be possible to produce in any land but Germany an educational memoir so trustworthy in its facts and in its infer-

heretofore, to be developed according to non-Germanic methods. Nevertheless it would be deplorable if the leaders of progress in this land were indifferent to the wonderful influence which has been exerted upon modern society by the systems of research, of publication, and of instruction, brought by the Germans to such a high state of development. Foundations, the earliest of which came into being five hundred years ago, have shown new vigor within the last half-century, and were never so well worth study as now.

In every important institution of learning in this country, there are scholars who have felt the beneficent effects of German method in their own intellectual culture, who have been inspired by German enthusiasm and devotion, who have profited by German erudition and research, and who are endeavoring to hold up to Americans the example of German scholarship. To all these persons we particularly recommend the study of Dr. Conrad's volume. It will not show what wonderful contributions have been made to knowledge during the past fifty years, nor the effect of university education upon the political and religious condition of the country. It will introduce the reader neither to great books nor to great men. But it will reveal the results of academic administration in bringing together large bodies of teachers and students, and of holding them by positive restrictions and requirements to prolonged and systematic study.

We hear a great deal of the freedom of academic life in Germany, *Lehr-freiheit and Lern-freiheit*, and especially from those who would carry the elective principle through all our institutions of learning; but, in the German-university system, laws and regulations, traditional, political, and institutional, are to be met with at every turn. To begin with, the establishment of a university does not depend upon the bounty of a millionaire, nor upon the religious zeal of some ecclesiastical body. Universities are not established to bring fame to private individuals, to give value to corner-lots, or to make a local school for boys or girls appear to better advantage because it bears an aristocratic name. In this country, the name university is not protected by law or by tradition; and authority to confer the rights and dignities of academic degrees can be secured in most states more easily than a charter for a horse-railroad or a bank. But in Germany, since the first foundation at Prague in 1348, only forty-two universities have been established; and of these, sixteen, for various reasons, have been given up, or combined with other institutions. Only three new foundations have been laid in this century, — at Berlin, Bonn, and Munich; and of these, the two last were based on earlier undertakings. The new university at Strassburg is, in fact, the revival of an old name. There are to-day, in so much of Germany as constitutes the German empire, but twenty-one universities, — ten in Prussia, six in South Germany, four in the minor confederated states, and one in the Reichslande; but what a score they are!¹

The restrictions placed upon the establishment of universities are equalled by those which control their interior organization, their distribution into faculties, their responsibility to the government, their employment of funds, their modes of instruction. So also even the boasted freedom of students is a freedom based upon law which would seem tyrannical to the American public. The university portals are not open to every one. Those who would enter them, if belonging to the country, must bring the final certificate of the gymnasium; and that cannot usually be acquired without eight or nine years of rigid discipline in a school where the studies are obligatory, and where every hour of every week has its appropriate pre-appointed task. Great opposition has been made to the admission of students from the real-schools to the universities, especially in Prussia; and the controversy, in respect to the essentials of a liberal education, is still in progress, with a tendency, so far as we are able to judge, toward the re-affirmation of the principles of gymnasium instruction, and the belief that this is the only fit introduction to university privileges.

From these general remarks, we proceed to gather from the copious stores before us some statements in detail which may interest those who have not access to the pages of Dr. Conrad. Noteworthy fluctuation has been apparent in the attendance at German universities. At the end of the *twenties* (1821–31), the number of students was extraordinarily large; at the beginning of the *thirties*, there was a great and sudden decrease; in the *seventies*, a powerful increase; and the causes of this ebb and flow are an interesting field for trained conjecture. The drift of students toward Berlin, Leipsic, and Munich is remarkable, these three universities having forty-two per cent during the last *semester* which was under review. There has been an increase in the number of foreigners in attendance, but the importance of this element has relatively decreased during the last twenty years. In 1880 there were a hundred and seventy-three students enrolled from the United States, — mostly devoted to the philosophical faculty. The 'migrations' of German students are a very interesting subject of investigation. Just now north Germans go to the south, much more than south Germans go to the north. "It is the fine scenery, the mild climate, the geniality of south Germany," which prove attractive. "The desire to study at a large university, and the preference for cheap liv-

¹ The map which we have reproduced from this volume shows their geographical position.

ing," give Leipsic its advantages. An attempt is made to discover the social position of the fathers of students, but without much result, except in respect to Halle, the author's own sphere. His conclusion is, that it is "the custom for people who have had a university education" to give their sons like advantages; and, when an unusual increase in attendance is apparent, it is due to a recruiting from the families of subordinate officials, elementary teachers, etc.: though it is also obvious that people in the higher walks of business send more students to the universities now than formerly.

We pass by what is said in respect to the other faculties, in order to give such space as we can command to the philosophical faculty, the importance of which has increased actually and relatively. The time is almost within the memory of our older contemporaries when every student belonged to one of the three faculties of law, medicine, or theology; and if he also followed lectures in the philosophical department, it was as supplementary or preliminary to his professional course. All this is now very different, in consequence of the enormous importance which science has gained in the whole development of our culture. In forty years the number of students of science has increased tenfold: the students of philosophy and history have not yet been tripled, but even they have increased faster than the students of medicine. This faculty also shows the largest increase in the number of teachers, so that at present more than half the entire teaching-body at all the universities belong to the philosophical group. The new foundations are especially for comparative philology, modern languages, archeology, Egyptology, geography, agriculture, etc. The professorships of history have been increased with reference to better instruction in modern history. 'Exercising-classes,' seminaries, private training-schools, are coming more and more into vogue, as complementary to the ordinary lectures. "We admit to the teaching-office only men of proved ability and capacity to promote learning. This is the sole test." Some would even think that "too little weight is attached to power of communicating, and that too exclusive regard is had to literary activity."

Those who would see with what painstaking accuracy the statistics which underlie these statements have been brought together, must go to the volume itself. We have only endeavored to arrest attention to the many suggestive lessons with which the work abounds.

THE CHANGE IN THE GREAT NEBULA IN ANDROMEDA.

THE remarkable change in the great Andromeda nebula, discovered by Dr. Hartwig, the news of which has just been received by cable, is an event of capital importance to astronomy. It will be a disappointment if it should fail to afford substantial aid in directing conjecture, and narrowing the field of hypothesis, as to the construction of the sidereal universe; a problem in regard to which our present knowledge is so defective, that the imagination has hitherto wandered, guideless, in a vague region of speculation.

The sudden appearance of a star of about the eighth magnitude, in the middle of this well-known object, is a phenomenon which, although extraordinary, is not unique in astronomical history. An exact counterpart seems to be furnished by the star, which, in May, 1859, suddenly shone out in the nebula or cluster 80 Messier. The analogy is so striking, that it is worth while to recount the various features presented.

The object 80 Messier, or 4,173 of Sir J. Herschel's general catalogue, was described by its discoverer in 1763 as a '*nebuleuse sans étoiles*.' Sir W. Herschel characterized it, however, as the richest and most condensed cluster in the heavens. Other observers, including Sir J. Herschel, Argelander, d'Arrest, and Pogson, have always described it as cometary or nebulous. In ordinary telescopes, and with moderate powers, it is certainly irresolvable. I am very familiar with its aspect in the six and one-fourth inch Clacey refractor in the west dome of the Harvard observatory, having had occasion to examine it, and the surrounding region, a great many times in observing the variable stars R, S, and T Scorpii. I have always seen it as a beautiful, bright, circular, nebulous mass, running up towards the centre into a strong condensation of light.

It was nearly in the middle of this nebula, that Auwers, at Königsberg, found, on May 21, 1859, a bright star, which, on many previous occasions, the last only three days previous, had certainly not been visible. He estimated it as 7th magnitude, and Luther as 6.5. On May 25 it had become sensibly fainter. It was independently discovered by Pogson, in England, on May 28, when, on looking for the neighboring known variable stars, he was startled to find in the nebula itself a star of the 7.6 magnitude. He is certain that on May 9, his last previous examination of the

region the nebula had presented its usual appearance, and that here was nothing stellar about it. By June 10 the star had vanished; but the cluster seemed to shine with unusual brilliancy, and a marked central condensation. Since that time the object has been closely watched by Schmidt at Athens, who examined it at least one thousand times between 1861 and 1877; but the star has never been seen. Spectroscopically observed by Col. John Herschel, on April 13, 1868, the nebula exhibited a continuous spectrum.

The only other similar case that I am aware of, is the variable R Monocerotis discovered by Schmidt in 1861. It is situated in the southerly end of a faint cometary nebula. The phenomena presented are, however, much less striking, more resembling those of an ordinary variable star. Schmidt has seen it as bright as 10th magnitude. I have never found it brighter than the 12th; and ordinarily it is invisible, or very near the limit of visibility (which I arbitrarily assume to be 13th magnitude) of the six and one-fourth inch Clacey refractor.

The future developments in regard to the new star in the Andromeda nebula will be followed by astronomers with the greatest interest. This event, too, should draw attention to a subject of observation which has been entirely neglected. Hitherto, the question of nebular variation has been confined almost entirely to examination of evidence of fluctuation in the apparent brilliancy of the nebulous appearance itself. But the peculiarities in telescopes and observers, and variations in personal, atmospheric, and other conditions, render it very difficult to decide upon such evidence. Consequently, while there are one or two nebulae in which, perhaps, a change appears somewhat probable, the subject is surrounded with uncertainty and difficulty. A more promising field, however, is opened in the examination of known nebulae to detect the existence, and estimate the brightness, of stellar nuclei; since we have satisfactory means of comparison and measurement of this kind. Fortunately, this is a kind of observation which needs for its proper prosecution only an ordinary telescope. In the investigation of the variable stars, Argelander's method of observation has proved, in precision, convenience, and fruitfulness, superior to any photometric apparatus yet devised. A new application of it is here suggested, which, it is hoped, will give employment to some of the idle telescopes in the hands of amateurs.

Cambridge, Sept. 7.

S. C. CHANDLER, Jun.

THE ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS.

THE second meeting of this association was held in Washington, Sept. 1-2. In the absence of the President, Prof. S. W. Johnson of New Haven, Dr. H. C. White of Georgia presided. Delegates were present from most of the states exercising control or inspection of fertilizers. A number of other chemists interested in agricultural analysis, but not occupying official positions, were present, and took part in the proceedings.

Commissioner Colman, in an introductory address, spoke of the importance of securing uniformity of action among chemists, not only in the analysis of fertilizers, but also in all analytical processes pertaining to agricultural chemistry. He referred to the impetus which scientific agriculture had received from the labors of Liebig and his successors. He believed that all experimental agricultural work should be accompanied by careful chemical control, without which its full value could not be secured. He thought that the general government ought to co-operate with the state governments in passing the most stringent laws against the adulteration of foods. Continuing, he said, "In so simple a matter as the adulteration of milk, it would be hard to secure a conviction in a court of justice for any person practising it, because of the absence of any official standard by means of which the extent of the adulteration could be measured. It should be the object of the chemical control of agriculture, not only that abundant crops should be produced, but also to see that the products of the fields should be delivered to consumers free of any cheap or deleterious adulteration. The frauds that are practised upon the public in adding cheap, and frequently harmful, ingredients to the food we eat, ought to be exposed in no uncertain way. To such an extent is the adulteration of butter, and the manufacture of a counterfeit article, carried on, that the great dairy interests of our nation are now almost prostrate. Many an honest producer has become bankrupt in trying to keep up with his unscrupulous competitor."

After the commissioner's address, Mr. E. H. Jenkins, chairman of the committee on the method of estimating phosphoric acid, reported the results of the labors of the committee during the past year. He gave first a review of all the new processes which have been suggested for determining phosphoric acid. Samples of various kinds of phosphates had been sent out to the different members of the association in sealed packages, and the results of the analyses had been received and tabulated. In general, the agreement of the analyses was very satisfactory, especially in the amount of total phosphoric acid estimated. In the so-called reverted phosphoric acid, or phosphate soluble in solution of citrate of ammonia, the agreement was not so perfect. Nevertheless, the deviations from the mean were not any greater than could be expected from the nature of the material analyzed, and the difficulty of securing perfectly uniform results with the reagent employed. The com-

mittee suggested a few unimportant changes in the method adopted last year at Philadelphia, and which had been practised by the members of the association with such success during the past year.

Dr. H. W. Wiley presented the report of the committee on the method of imitating potash. The first part of the report was devoted to a review of all the different methods of estimating potash which had been proposed during the text twenty years. After a discussion of the merits of the various methods examined, the committee decided that none of them was superior to the method adopted by the association at its Philadelphia meeting. They recommended, therefore, that with certain slight modifications, consisting more especially of the insertion of the details of the manipulation, the Philadelphia method should be continued. The only important changes which were introduced were in directing the treatment of the sample with hot water, for the extraction of the potash, instead of water acidulated with hydrochloric acid; in the addition of a small portion of oxalic acid to facilitate the conversion of nitrates into carbonates; in the recommendation to abandon the washing out of the double chloride by hot water after its first weighing, a process which, by experience, had been found to be unnecessary; and in recommending the continuance of the factor 30.56 for the conversion of K_2PtCl_6 to KCl instead of the factor 30.67, which would be the proper one if the atomic weight of platinum, as determined by Seubert, be the correct one. The committee, in making this recommendation, did not wish to be considered as in any way criticising the accuracy of Seubert's work. Prof. F. C. Clarke stated, that, in his opinion, 195 represented much more nearly the atomic weight of platinum than 197, and that, therefore, the larger of the two factors given above would be the more correct one for computing the amount of potassium chloride from the double platinic chloride. The report of the committee was adopted for the guidance of analysts during the coming year.

Mr. F. H. Gladding read a paper on a new method of estimating potash, which was ordered printed with the proceedings.

Mr. P. E. Chazal presented the report of the committee on determination of nitrogen. He stated that the committee was quite dissatisfied with the results of their work, and hoped that the association, without taking any action whatever, would refer the whole matter to another committee, to be presented at the next annual meeting. The recommendation was adopted.

The following officers were elected for the coming year: President, H. W. Wiley, Washington, D.C.; vice-president, C. W. Dabney, Raleigh, N.C.; secretary and treasurer, Clifford Richardson, Washington, D.C.

The following committees were also appointed: Executive committee in addition to the above officers,—H. A. Huston of Indiana, and W. J. Gascoyne of Virginia. On phosphoric acid: H. C. White of Georgia, E. H. Jenkins of Connecticut, W. C. Stubbs of Louisiana. On nitrogen: P. E. Chazal of

South Carolina, J. A. Myers of Mississippi, W. E. Moses of Tennessee. On potash: W. J. Gascoyne of Virginia, Clifford Richardson of Washington, N. W. Lord of Ohio.

The convention discussed the proposition of enlarging the scope of the association, and it was the unanimous opinion of all present that this should be done in harmony with recommendations made in the address of the commissioner. The association then adjourned to meet in Washington at the call of the executive committee in September, 1886.

THE HISTORICAL ASSOCIATION AT SARATOGA.

OF the three hundred members of the association, about fifty attended the recent meeting (Sept. 8-10). In addition to those who played a more or less prominent part in its organization last year (*Science*, No. 86), there were present at one or more sessions, Goldwin Smith, Gen. Cullum, Washington Gladden, Henry Adams, Henry C. Adams, Eugene Schuyler, Rufus King, Professors Gurney, Andrews, James, and Coman, Nathaniel Paine, S. S. Green, E. M. Barton, and Mrs. Lamb. The old officers were re-elected with the exception of George Bancroft, who took the place of Andrew D. White as president for the next meeting, and Professors Franklin B. Dexter and W. F. Allen, who succeeded to the places on the council left vacant by the retirement of Professors Tyler and Emerton. The finances of the association are in a flourishing condition, there being over a thousand dollars in the treasury at the close of the first year. The council elected the German historian Ranke, the first, and, for the present at least, its only honorary member.

The papers presented were mainly upon subjects connected with American history; and it is greatly to be desired, that the scope of the association's work should be enlarged, and that more essays should be presented dealing with European history. Apart from this, the most noticeable feature of the meeting was the great desire shown by the members to gather in small groups, and exchange ideas. This deserves encouragement; and it is hoped, that, at the next meeting, less time will be given to the reading of papers, and more opportunity be afforded for social intercourse.

President A. D. White opened the first session with some comments, or a syllabus of an essay on the influence of American ideas upon the French revolution. He was followed by Professor Goldwin Smith of Toronto, who endeavored to show by the history of Canada that the American revolution was a mistake, and that a peaceful separation, which time would have brought, would have been better. These two papers occupied the morning session. In the evening, Jeffrey R. Brackett, a graduate of Harvard, presented a report on certain studies of the institution of negro slavery, which he is now making at Johns Hopkins. He especially advocated the study of the blacks as a race, and laid particular stress upon the danger of

relying too implicitly upon the statute-books for data; as the mere fact of a law being among the statutes of a particular state is of little importance unless one knows whether the law was executed or not.

Dr. Justin Winsor then referred to an Italian portolan chart of the sixteenth century, which had recently been acquired by the Carter-Brown library of Providence, as probably the only specimen of an early sea-atlas now preserved in an American library. It has five maps showing the American continent, two of which illustrate the theory which made North America and Asia identical. The atlas resembles what is known as the Charles V. portolan, and is also like another now in the Riccordiana in Florence. The dates of these, as understood, led Mr. Winsor to place this new specimen somewhere between 1540 and 1550; and the condition of geographical knowledge shown in it comports with such a supposition, a due allowance for the errors and limitations always found in charts of so early a date being made. After, Mr. H. Tuttle of Cornell presented a long bibliography of materials for the history of the reign of Frederick the Great of Prussia, which have appeared since Carlyle wrote, and which may be considered as justifying a new life of that potentate. Professor Ephraim Emerton, in a ten-minute report on the value of Janssen's History of the German people during the reformation period, aroused considerable interest. President White agreed with Dr. Emerton as to the deceptive methods of presentation adopted by Janssen, and compared it to a history of the late civil war, in which the main accent should be laid upon a few over-fervid utterances of Garrison, Phillips, and Pillsbury; upon Mr. Seward's false prophecies, Mr. Lincoln's story-telling, the personal habits of some union generals, and the like. Prof. E. B. Andrews, while agreeing with the previous speakers, said that such books were useful as throwing a side-light upon the real character of the reformers and the reformation. In concluding, he warned all students who read German books, or who go to Germany to study, to beware of the dogmatic tone of many German historians. Professor Goldwin Smith also contributed to the discussion.

The next morning the Rev. Dr. M. C. Tyler read an abstract of a paper by the bishop of Missouri on 'The Louisiana purchase, and its influence upon the American system.' The abstract showed that the paper was one of great value; but as Mr. Henry Adams remarked, the subject was one that could be properly treated only in volumes, and not in a single essay, even so complete as the one just presented. He thought, however, that more stress should have been laid on the fact that the acquisition of Louisiana, by an extreme use of the treaty-making power, did, in fact, create a new union upon a broader basis than the original union as defined by the constitution of 1787. Judge Douglas Campbell and Mr. Rufus King followed in the discussion.

Mr. John Addison Porter then read an abstract of an essay, which will appear shortly in the Johns Hopkins' series, on the origin and administration of the city of Washington. Particular attention was

paid to a critical analysis of the 'Shepherd ring.' He added that the federal city and district owe their present names to the commissioners who served with Washington in planning the city.

The evening session was opened with a discussion of the problem of municipal government, until Mr. Schuyler declared, that, in his opinion, such discussions were hardly within the province of an historical association. This was followed by a number of reports; and then Mr. Irving Elting of Poughkeepsie, the first announced speaker of the evening, read a well-written abstract of a paper on the Dutch-village communities of the Hudson River, which he thought exhibited, during colonial times, many of the peculiarities of the primitive German mark. The towns of Hurley and New Paltz were instanced as typical communities. In the former, the common lands were divided so as to give mere residents, as well as free-holders, a share in the allotment; while in New Paltz, the ancient institution of the 'Twelve men' survived even into the present century. The remainder of this session was occupied with a discussion of the origin of *vlie*, bowery, and kindred words. The latter, Mr. Elting said, meant simply 'home-lot.' By this time it was so late that the association adjourned, after having disposed of but one number of the programme as announced on the posters.

The next morning Dr. Josiah Royce gave the substance of a chapter from his forthcoming work on California. He demonstrated by documents which have been discovered by Mr. H. H. Bancroft and himself, that the original purpose of our government was to get California from Mexico through peaceful intrigue, and by the act of its inhabitants. To this plan the operations of Captain Fremont were in actual opposition; although the speaker did not in this paper undertake to criticise Captain Fremont's acts, nor to explain them. After some remarks by Mr. W. A. Mowry, on the influence which the acts of the agents of the Hudson-bay company may have had on our government in its dealings with the Californians, Dr. J. F. Jameson of Johns Hopkins read a paper advocating the more careful study of the constitutional and political history of the several states. Dr. E. Channing followed with a few suggestions as to the value of the study of the historical geography of the territory comprised within the present limits of the United States.

Our reporter was not present at the evening session, but, through the kindness of Mr. E. Schuyler, is able to give a brief account of the latter's paper on 'Materials for American history in foreign archives.' It seems that the increased study of original documents during the last fifty years has led to great reforms in the management of the European state-paper offices, which are now well arranged, and easily accessible to students. Various nations, especially England and France, have filled in the gaps in their own collections by copies from papers preserved elsewhere. The reverse of all this Mr. Schuyler declared to be true of our own state department, which has the distinction of keeping its archives less accessible than those of any European nation, — an assertion which was borne out by Dr. Royce's relation of

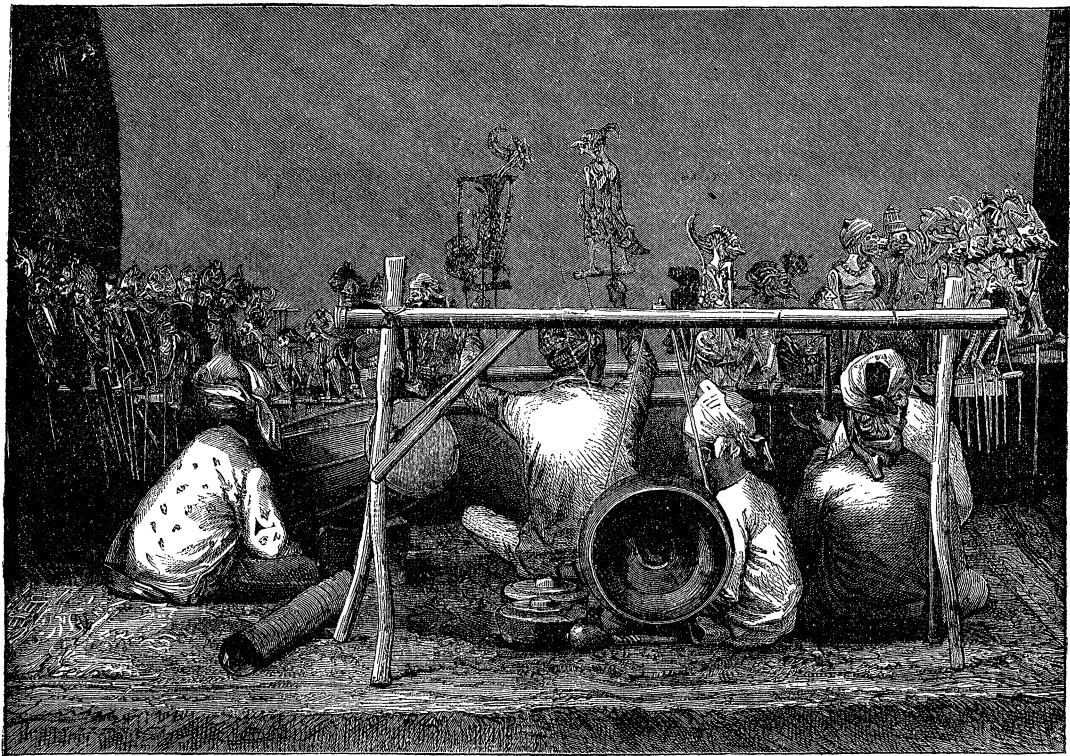
his experience while searching for the well known 'Larkin despatch.' In closing, Mr. Schuyler declared, that if the papers now unpublished, and hidden from the world in these great foreign store-houses, were printed, the history of the American revolution, and of the early years of our country, would have to be entirely re-written. He asked the association to petition the government to catalogue all papers accessible in foreign countries, and to transcribe and print those that are of importance.

PUPPET-SHOWS IN JAVA.

THE Javanese take great delight in theatrical performances. One form of these is the Wajang, or pan-

stage properties, and a jar in which incense is burned before the performance, and a copper basin to receive offerings to the spirits (which consist of food, of which it is thought the spirits eat the immaterial part, although in fact the Dalang or one of the musicians takes it home).

The puppets are about two feet high, and are made of very thick buffalo-leather, or carved from wood, painted all sorts of colors, and sometimes gilded or silvered, those highly ornamented representing people of rank. Their forms are hideous, and have nothing human about them. The arms, which are movable by little rods attached to the extremities, and hands, are very long and narrow; the face is pointed, and resembles the beak of a bird (some, however, are round, and decorated with a huge nose



BEHIND THE SCENES AT A PUPPET-SHOW IN JAVA.

tomimes, where the actors are represented by puppets moved by a man called the Dalang, who recites all the parts. For the performances a curtain is erected, on which the shadows of the puppets are thrown. The women are placed on one side of this curtain, the Dalang on the other. At his right sit the men, and at his left the young people. By this arrangement, only the men see the puppets directly: the women see only the shadows. Behind the Dalang is the orchestra; and around him are scattered his

Translated from *La nature*.

and teeth); the eyes are either narrow and long, or large and round; and some have an enormous stomach, while others are hump-backed. These forms explain themselves; for they can only represent conventional types well known to the people, whose characteristics are exaggerated in order the easier to be recognized.

The origin of the puppets, according to the Javanese, is as follows: One morning, while a woman was engaged in washing her rice, she saw the trunk of a tree floating toward her. She tried to push it

off; but, in spite of her efforts, it kept coming back. Finally she drew it to the bank. Three days afterward she had a vision, in which she heard a human voice complaining, and demanding to be released from the trunk of a tree in which it was enclosed. The woman told her husband of her dream, and they concluded that the dream must refer to the tree which the woman had drawn to the bank. They brought it to the house, and cut it open, and found within a puppet similar to that of the Wajang Kalitik, which they named Kjai Gandroung. Several days after, in a dream, the woman again heard a voice saying, "I am the wife of Kjai Gandroung, and I desire passionately to be re-united to him." The woman asked her where she was, and was told that she was enclosed in one of the two trees before the house. On cutting off a branch of one of the trees a very pretty puppet of the Wajang Kalitik was found. It was placed beside the other, and given the name of Njai Gandroung. The man put them in a box, and then made a number of similar puppets after these two models. This box descended from father to son, and is at present in the possession of a Dalang of Pagoung, regent of Kediri. The two puppets are said to be in the same state as when found, and many poor people come to make them offerings in order to obtain the fulfilment of their wishes. When an extraordinary representation is desired, Dalang of Pagoung is invited to come with his chest containing the puppets.

Besides the performances where puppets only are on the stage, there is another kind of Wajang where the parts are taken almost altogether by women. It is called the Wajang Wong, or Ringgit Tijang; and the actors are dressed and painted to resemble the persons whom they are meant to represent. But they do not speak: the Dalang always recites their parts, while they only dance and sing.

THE RECENT TORNADOES.

THE recent tornadoes, which the newspapers still persist in calling 'cyclones,' in Pennsylvania and adjacent states, seem to have had all the peculiarities of the typical storms of the west. The whirling funnel, or conical cloud, and the excessive destruction that accompanies its rapid passage along a narrow path, are clearly made out: the occurrence of several whirls near one another in south-eastern Pennsylvania on the afternoon of Aug. 3 is equally characteristic of this class of storms. The tornado in Philadelphia was well developed; and, by reason of passing over a thickly populated district, it proved especially destructive. A letter from Mr. S. E. Paschall of the Bucks county (Penn.) *Intelligencer*, describes the passage of three tornadoes in his neighborhood on the same day, one of which he regards as a continuation of the Philadelphia storm: when it reached the town of Churchville, it wrecked nineteen large and twenty-eight small buildings; it struck a cemetery, and scattered the tombstones, and even tore the bark from trees. Its course was a little east of north: the other

two storms travelled north 35° east. It is with regret that one notes the absence of discriminate observation concerning the immediate mechanism of the tornado among the many newspaper columns given to the description of its general appearance and destructive action. Few observers who speak of the rotation of the conical cloud mention the direction of its turning: no one seems to have watched the downward extension of the cloud sharply enough to say whether its 'plunging' toward the ground was real or apparent, although it is probable that this important point might be directly determined by looking closely to see if the wisps or fibres of cloud at the base of the cloud rose into it or descended from it. It can hardly be doubted that the 'plunging' is only an optical effect of the growth of the cloud-forming space downward, faster than the cloud particles are carried upward; for heavy objects are carried high aloft in the centre of the whirl, and this could hardly be if the wind descended there. The circulation of the upper winds should also be determined by noting the motion of the clouds overhead at different times during the tornado's passage; for it is probable that much of the working of the storm is well above the ground, and that we feel only its most violent central action; and, if an observer be found, with presence of mind equal to doing all this while the tornado is roaring past, it would be well to notice whether the clouds above him are forming or dissolving. A tornado is an elaborate experiment, and very critical observation will be needed to follow all its action.

W. M. D.

THE BACILLI OF CHOLERA ASIATICA AND CHOLERA NOSTRAS.

WE have received within a few days a copy of Finkler and Prior's latest work upon the curved bacilli of cholera nostras, and of cholera asiatica. (*Ergänzungshefte zum centralblatt für allgemeine Gesundheitspflege*, 1885.) It will be remembered that these observers found in the discharges of patients, in an epidemic of cholera nostras, bacilli which they at first considered to be identical with the organisms found by Koch in cholera asiatica. Various slight differences in the behavior of the two organisms under cultivation were observed, and the paper before us contains the results of a great deal of work undertaken to prove the exact nature of the relationship between the two organisms. It contains chapters upon the morphology and behavior under cultivation of each bacterium. The differences between the two are well considered; and a full account is given of the inoculation experiments undertaken with intestinal dejecta, and pure cultures of the two bacilli.

The conclusions of the authors are given in the following *résumé*:—

1°. We have established the occurrence of Koch's comma bacillus in the intestinal contents, and dejections of cases of cholera asiatica in the epidemic of 1884, at Genoa.

2°. We have found comma bacilli in the dejections

of cases of cholera nostras: we observed them both directly in the intestinal contents, and by cultivation experiments, and studied their characteristics.

3°. Both these comma bacilli are vibrios, which form genuine spirilla. As well in this stage, as in the variations which the form undergoes, are the two vibrios similar.

4°. The behavior under cultivation of the two organisms is almost identical. They vary only under very limited differences of culture media and temperature: and the differences consist not so much in *absolute* as in *relative* variations; i.e., greater energy of growth and vitality of the vibrio of cholera nostras.

5°. Of the physiological properties of the vibrios we have especially remarked — and have clearly determined — their marked resistance to drying, varying temperature, and '*fäulniss*.'

6°. We claim the possibility of a resting stage, and consider it probable that this resting stage is similar to that of other micro-organisms.

7°. Both vibrios are pathogenic.

8°. The pathogenic property of Koch's vibrio is greater than that of the vibrio of Finkler and Prior. There is here also merely a *relative* difference.

9°. The pathogenic property does not exist for all species of animals: much the greater number possess an immunity against both vibrios; they are also pathogenic only under certain conditions. The susceptible animals, and the conditions for producing positive results, are the same for both vibrios.

10°. The symptoms produced in animals by these vibrios have great similarity to those of cholera in man; they are not specific, however, but can also be produced in guinea-pigs by other infectious materials and chemical poisons.

11°. The causal connection between the comma bacillus and cholera asiatica is rendered probable by its constant presence, but is not made certain by the results of inoculation experiments. The causal relationship between the comma bacillus discovered by us and cholera nostras, is rendered probable, first, by the discovery of the micro-organism, and, secondly, by the very great similarity between the symptoms of cholera nostras and asiatica, as well as by the similarity in biological and pathological properties of the two comma bacilli.

12°. The two vibrios can pass into the blood after injection into the intestine, and can be excreted in the urine. The situation of Koch's vibrio in the body so increases its rapidity of development, that a new point of resemblance under cultivation between the two vibrios is furnished.

These conclusions are all supported by the work which is recounted in the text, and which gives evidence of great care and much labor. As will be seen, the claim of identity between the two organisms is abandoned by the discoverers of the later one; and the differences are brought out as well as is possible at the present time. The strong point made by John and others of the constant difference in appearance of gelatine-cultures of these two organisms of the same age, is refuted by the authors, and would cer-

tainly seem to be completely upset if the figures they give be exact reproductions from nature. At least the differences in appearance between colonies in gelatine of the same age, cannot be taken as *diagnostic*, as some writers upon the subject would have had us believe. There are a number of very fine plates which accompany the book, and give beautiful representations of the microscopic appearances of the two organisms.

The work is very creditable to its authors in every way, and is truly refreshing to read after seeing all the hasty work that has been rushed into print upon the same subject. It cannot be said, of course, that the absolute specific nature of either of the bacilli under consideration has been determined — the positive results of the inoculation experiments were not sufficiently numerous to permit that. It is perfectly true, however, that this work has assisted materially in establishing the *probability* of their specific nature; and certainly results of such excellence can but do good in forcing others to attempt the same.

THE COAST-SURVEY AND 'POLITICAL SCIENTISTS.'

THE following letter from the New-York *Evening post* of Sept. 10 is in reply to an article in the same journal for Aug. 13, and reprinted in the *Nation* for Aug. 20. We reprint it here for the interest that it has to scientific men, and desire to call the attention of persons connected with the government to the passage which we have taken the liberty to print in italics.

The article on 'Political scientists' in the *Evening post* of Aug. 13, while it contains many wholesome truths concerning the management of scientific affairs in Washington, reflects with unnecessary severity on the administration of the coast-survey. This article, so far as it concerns the survey, is based upon a report drawn up by a committee of treasury experts, who condemn alike the organization, the methods and the expenditures of the coast-survey. While giving due weight to certain features of their report, we cannot expect that a committee so constituted, however competent to judge of business methods, should know the value of the scientific work upon which, from their point of view, money has been squandered.

Even when their criticism is just, the fact remains that the late superintendent is in no way responsible for the rules which control the general direction of his bureau. He inherited from his predecessors the superintendence of an old and well-trained *personnel*. This has not been materially changed during his administration. Mr. Hilgard did not enlarge the field of operations, but limited himself to the carrying out of plans already formed. In obtaining the appropriations necessary to this end, he relied greatly on the advice of his principal assistants.

In this connection it may be added, that the coast-survey is the only scientific bureau the appropriations for which are distinctly allotted to special objects.

The superintendent has, therefore, little liberty of action. For instance, the very sums devoted to pendulum experiments, so strongly condemned by the committee, must have figured in the estimates submitted by him to congress. Neither could Mr. Hilgard be expected to reduce the coast-survey force, when appropriations, insufficient, it is true, to keep the force fully employed, were distinctly made to pay the salaries of the employees who had grown old in the service of the government. The publications of the coast-survey only contain communications strictly relevant to such investigations as were authorized by the appropriations. As to the experts living at a distance from Washington, such specialists have always been employed by the coast-survey. They have usually received a very moderate compensation for work carried on in addition to their usual avocations,—work which could not have been done otherwise except at great expense.

The article in the *Evening post* implies that the coast-survey has been a party to the distribution of scientific salt in the shape of gifts, such as photographs, chromo-lithographs, illustrated books, and the like, and has also done its full share in the way of personal favors to congressmen. Whatever have been the failings of the administration of the coast-survey, there never has been a 'political scientist' at its head; and the above charges are, so far as I know, absolutely false. My belief is based on an intimate association of many years with this department of government work.

The method of investigation adopted in this case seems somewhat autocratic. Even at this day the superintendent has not seen or been able to obtain a copy of the charges brought against him, having merely been requested to reply in writing to a number of questions. He himself, as well as the assistant in charge of the office, the disbursing agent, and the chiefs of two divisions, were suspended: in other words, disgraced, if not dismissed, before the investigation was begun. Some of these officers had served the department faithfully and intelligently for nearly forty years. Such off-hand condemnation of a bureau from which so much work has gone forth of a character most honorable to the science of the country, is surely to be deprecated in itself, and can hardly be considered by scientific men as less than an outrage upon them all. They have a right to ask that the wholesale imputations thus cast upon official science should be carefully verified before they are accepted.

Thus far the scientific public has received the report of the commission through the newspapers alone, and the press has been liberally supplied with inaccurate and *ex-parte* statements in regard to the investigation into the coast-survey affairs. Their dictum upon the late superintendent, at least as far as his professional career is concerned, is answered by his position as an investigator in the scientific world. In this jury, called for the express purpose of deciding upon the value and efficiency of scientific work, men of science have had no voice.

On several occasions attempts have been made, through the medium of the National academy of

sciences, to revise the organization of the scientific bureaus according to a comprehensive plan, which might remedy the evils of the present system. A committee of congress has at last taken up the matter, but nothing of value has as yet been effected; nor have the recommendations of the academy had the least weight with government officials, or with members of congress. No member of the cabinet has availed himself of its councils, though the academy was especially chartered by congress to be the scientific adviser of the government. Since its organization, superintendents of the coast-survey, of the nautical almanac, of the signal-service, of the geological-survey, and of other scientific bureaus, have been appointed without consultation with the men of science in the country.

We do not ask that a scientific bureau should be absolved from the requirements of ordinary business methods, or that the dictates of common sense should be forgotten in its administration. Scientific men can only sympathize with the efforts of the administration to reform the management of the scientific bureaus at Washington. They protest merely against ignorant interference with scientific affairs. Is the superintendent of the coast-survey, the head of the nautical almanac, the director of the geological-survey, or the secretary of the Smithsonian, to submit the scientific expenses of these bureaus to the judgment of a clerk in the auditor's department? The necessary appropriations having been made, is that department, or any member of it, to decide upon the value of the scientific work thus provided for, or upon the method of its execution? Surely such an alternative would be worse than the state of demoralization said to exist now in our scientific bureaus. If this be the nature of the contemplated changes, they can only be dreaded by the friends of science.

The surveillance can hardly be too strict; but let it be intrusted, so far as scientific work and methods are concerned, to men who have some training in both. Undoubtedly there is much which should be changed at Washington with a view to introducing a proper co-ordination among the different scientific bureaus. But the blame for this does not rest on the 'political scientist' alone. The former secretaries of the interior, of the treasury, of war, and of the navy as well as congress, are partly responsible for the existing confusion and inefficiency; they have tolerated a duplication of work which has little by little brought about the present state of things.

One word more as to the character of the work done by the coast-survey. Professor Bache himself was perhaps the most successful of all the heads of our scientific bureaus, in obtaining from congress the appropriations necessary to the maintenance and efficiency of his department. He and Peirce originated the very scientific investigations now decried by the committee. Their successors have only carried out the methods and the physical experiments which they deemed necessary. Are these to be abandoned because a treasury expert has seen fit to condemn valuable experiments, and to indulge in a few cheap jibes about 'swinging the pendulum'? That he

should not see the use of such experiments in the natural. To one who does understand their importance, the wonder is that such an opinion should have any weight in such a matter. The standard of the early days of Bache is still the standard of a coast-survey work of to-day. Let us hope that ignorant criticism will have power to lower or impair the efficiency of a department of whose scientific record the country may well be proud.

While criticising the article of the *Evening post*, so far as it relates to the coast-survey, let me express my complete agreement with its condemnation of the 'political scientist.' It is time that the system thus attacked should be abandoned, and that indiscriminate scientific assistance, given by the heads of bureaus to institutions and individuals, and never contemplated or sanctioned by congress, should be discontinued. It has brought nothing but discredit upon the official science of the country. Let the most liberal appropriations be made for the work of our scientific bureaus, but let the requisitions be so complete and detailed as to invite a fair and open criticism.

ALEXANDER AGASSIZ.

Cambridge, Mass., Sept. 9.

THE THEORY OF VOLCANOES.

THIS work is a brief statement of the most general facts relating to volcanoes, with the citation of many examples of volcanoes of various classes, and their subordinate phenomena, by way of illustration. It is evidently intended for the most intelligent class of general readers, though valuable also to the specialist.

In the first chapter, Mr. Vélain describes the phenomena attending a volcanic eruption of the normal type, and with great propriety treats such an occurrence as a manifestation of the energy of the elastic vapors contained in the erupting materials, — a fundamental fact which should always be impressed as forcibly as possible upon the general reader. He also describes the various forms given to the lavas, the modes of accumulation of volcanic piles, the formation of cinder-cones, and the many forms of craters. He gives descriptions of some of the more remarkable eruptions of which records have been preserved, and these are chosen so as to illustrate the typical cases of the several classes of volcanoes. In this chapter may be found much information about volcanoes not described in English treatises on this subject, such as those of Reunion and the Island of St. Paul.

The second chapter, on the gaseous emanations, is, to the American student, probably the

most instructive one in the book. The investigations of Charles Saint-Claire Deville, of Scacchi, of Fouqué and Levy, are set forth in considerable detail, and well summarized. These are of great importance, and have, no doubt, received less attention from writers in the English language than they are entitled to. It may be remarked, however, that much more extended observations upon this class of phenomena are needed than those upon which the conclusions of Deville and Fouqué are founded. The pre-eminence of those investigators is a high warrant for the validity of their conclusions; but the experienced vulcanologist will perhaps feel that they are even more systematic and beautiful than he is accustomed to find volcanic phenomena to be, and he would like to see them tested by the widest possible verification. The whole chapter is admirable reading, and excellently arranged by Mr. Vélain.

The third chapter describes the lavas themselves, their methods of flow, and the forms they assume at solidification. Very little effort is made to describe the micro-characters of the lava, and this was probably judicious on the author's part; for these characters cannot be briefly summarized, and any attempt to do so would have exceeded the scope of his work.

The fourth chapter treats of the geographic distribution of volcanoes. The main fact he seeks to establish is, that volcanoes are, with the rarest exceptions, situated near the sea, or within it. At considerable length, and with reference to this generalization, he passes in review all the lines of active vents in the world. As a mere statement of facts, apart from any conclusions, his summary, though not free from errors, is a valuable one on many accounts: considered with reference to his generalizations, his treatment of the subject is open to grave criticism. One of the most important and comprehensive propositions he insists upon, is the linear arrangement of volcanoes. This idea has certainly a large amount of truth in it, but it has been enormously overloaded and overworked by writers of general treatises. The occurrence of half a dozen to a dozen small cones upon a single line of fracture twenty-five to a hundred kilometers in length, is very frequent in districts where the volcanic action has been diffuse. But a linear arrangement on a grand scale is another matter. The strongest case of it which can be cited is in South America, where many volcanoes are scattered in a most irregular array along the Andes; but no evidence has yet been brought to light, that any six, or even any three, of them have been built

Les volcans, ce qu'ils sont et ce qu'ils nous apprennent.
Par M. CH. VÉLAIN, docteur des sciences, maître de conférences
à la Sorbonne. Paris, Gauthier-Villars, 1884. 8°.

up over the same line of fracture. Viewed in their totality, they occupy a belt of country which is very long (over four thousand miles), and relatively narrow. Any one can judge for himself how far this arrangement is linear. Much the same may be said of the whole circuit of the North Pacific. In this volcanic girdle, there are many distinct volcanic areas, and more or less elongated belts; but the intervals between them are wide, and no inter-dependence has hitherto been shown to exist. Of course a line can be drawn through them all if it be crooked enough, and makes no note of the enormous gaps and *echelons*.

The generalization that volcanoes are near the sea, or in it, has also been overstrained. How far from the sea may a volcano stand, and still be said to be near it? If we say ten miles, then very few land-volcanoes are near the sea. If we say two hundred and fifty miles, then the statement holds good, but is shorn of a large part of its meaning. The reader must judge for himself whether a point a hundred and twenty miles or more from the sea is 'near' it; and the great volcanoes of North and South America are, on an average, about that distance from the ocean. Even in this qualified sense, the statement ceases to be true the moment we recur to those volcanoes which were active in middle and late tertiary time; for many of them in our own country were five hundred to a thousand miles away from any body of water, and those of central France and Germany were almost as far from the ocean as the configuration of Europe would permit.

The last chapter of Mr. Vélain's book, and the briefest of all, treats of the causes of volcanic action. In common with many others, he regards as the most acceptable view that lavas are squeezed out of a melted nucleus through a rocky crust by the contraction of the earth's interior by secular cooling. C. E. DUTTON.

BOLTON'S CATALOGUE OF SCIENTIFIC SERIALS.

It can hardly be true, that the series of scientific publications, whether in the form of independent journals, or as publications of societies, can be found more complete in American libraries than in European; but it certainly has fallen to the new world to give to the old the best lists of such periodicals extant. Scudder's 'Catalogue of scientific serials,' published

inside9, was almost the first attempt to embrace in one volume the bibliography of publications of this class; and the present volume, when brings the literature down to the close to the year 1882, has improved in many respects upon its predecessor. Especially is this the case in the fulness of the titles. The difference between these two publications is principally in that Scudder's catalogue was mainly restricted to pure science, while Bolton's extends to nearly all the fields of applied science, excepting medicine; but, on the other hand, with few exceptions, it does not include serials published by learned societies. The pains taken by Dr. Bolton is evident on every page of the catalogue, and it will long remain a most important auxiliary to every scientific library.

Besides various forms of index which add markedly to its value, especially the library check-list, enabling one to find at a glance where in America a given series may be found, we desire to call special attention to the chronological tables which follow directly the main list. In this, Bolton has followed a suggestion made many years since by Dana, but never hitherto carried into effect: it indicates the exact year for which each volume of certain long series of publications was issued; and it is an interesting study to see with what ingenuity the various changes undergone by such publications as the Edinburgh philosophical magazine for instance, with its various splits and absorptions, have been tabulated. In this list are included about five hundred of the most important journals; and it will save a vast amount of labor on the part of many a writer, who, with an eye to 'priority,' will wish to know in what year a certain volume of a given publication was issued.

The only criticism, which, it appears to us, can be made to the work, is on a matter which deals purely with typography. The type is much larger than is requisite or convenient for such a purpose, expanding the volume to nearly eight hundred pages: had it included, as we certainly wish it had, all publications of societies, its extent must have been doubled, and its bulk altogether unfortunate. This fault is especially seen in the chronological tables, which should have been compressed to nearly one-half their present space. It is one of the prime qualities of a good index, that it should be as compact as possible; and these tables, sharing as they do the nature of an index, ought thus to have been compressed. These, however, are faults only of style: concerning the body of the work, its method

A catalogue of scientific and technical periodicals (1665-1882), together with chronological tables, and a library check-list. By H. C. BOLTON. Washington, Smithsonian inst., 1885. 8°.

and its execution, we can have nothing but praise. Dr. Bolton has laid the scientific man of the whole world under a deep debt of gratitude; while those who really know the severity of the task he has so faithfully accomplished, will be forced to acknowledge that painstaking is not confined to Germany.

THE FIFTH VOLUME OF OHIO GEOLOGY.

THE fifth volume of the Ohio state geological report, crammed almost to bursting with extremely valuable information, up to more than eleven hundred pages of wretchedly thin paper, poor printing, and coarse illustrations and maps, puts us in doubt which to wonder at most, — the unenlightened niggardliness of the great wealthy pork-raising state of Ohio, or the intelligent, generous zeal of its few geologists. They, indeed, have evidently been urged on by self-sacrificing devotion to learning, and, far beyond what could have been expected from the petty means given them, have filled their measure to overflowing with knowledge that is either immediately and obviously useful, or of less direct, but wider, more manifold, and of more lasting utility.

About seven hundred pages of the report, themselves enough for a bulky tome, are the work of the able state geologist, Professor Edward Orton, done "in conjunction with the duties of his professorship at the state university;" for, of course, the state could not afford even to employ the chief of so important a survey on full time. He discusses in a hundred and twenty-eight pages the stratigraphical order of the lower coal-measures in Ohio; in forty pages, their coal-beds; in three hundred and fifty-two pages, the mines upon them, county by county; in sixty-five pages, the iron ores of the state, geologically and geographically considered; and in sixty-five pages (collaborating with Dr. G. W. Hawes), its building-stones, especially the celebrated Berea grit. He wisely avoids attempting to assign numbers to the different coal-beds, — an impracticable or impossible task, since they thicken up in so many places, or thin out and disappear, — and adopts the local names already in use in western Pennsylvania, where steeper valleys, with less drift and more frequent exposures, have earlier enabled the order and identification of the beds to be correctly made out. He maintains that the coal-beds never extended much, if at all, beyond their present northern boundary, and that the great basin gradually

contracted by general elevation, and argues that their thickest portions are confined to their borders. He has to point out that more careful surveys reduce the formerly supposed extent of the workable coals. Rarely are there more than one or two workable coal-beds at any one spot; and there is great loss of coal from tenderness, impurity, or a poor roof or floor, as well as from lack of proper care. He shows (p. 263) that a considerable disturbance occurred near the end of the lower coal-measure period in Tuscarawas county.

The state chemist, Prof. N. W. Lord, besides twenty-eight pages on the chemical work of the survey, including fifteen pages of tables of analyses, contributes an admirable chapter (a hundred and seventeen pages) on the iron manufacture of the state, noticeable for the extent to which raw bituminous coal is used, and in the hanging-rock region for the amount of charcoal-iron still made. In spite of some deficiency in rhetoric (so apt, with language, grammar, and logic generally, to be neglected by scientific men, to their own immense disadvantage in respect of easy mental work as well as to the discomfort of their readers), he certainly has the root of the matter in him; and his thorough comprehension of the subject results in sound practical advice. Good sampling gives much greater value to the analyses than any in the previous volumes have.

The state geologist's son, Mr. E. Orton, jun., gives an excellent chapter (seventy-nine pages) on the clays and all their manufactures, from common brick up to terra-cotta; and one (twenty-five pages) on the coals of Coshocton county. The former state inspector of mines, Hon. Andrew Roy, contributes a very good treatise (seventy pages) on the coal-mining of the state, including some notice of the coal-cutting machinery that is gradually coming into use. He has, too, a dozen pages on the coals of Jackson and Wellston. There are also a very good chapter (twenty-two pages) by Mr. H. Newton on coke-making; one (twenty-eight pages) by Mr. E. McMillin on the gas-coals; one by Prof. G. F. Wright (twenty-three pages) on the glacial boundary, pointing out that it separates better soils on the north from poorer ones on the south; one by Prof. A. A. Wright (twenty-seven pages) on the coals of Holmes county, with the scales of its numerous columnar sections, each carefully marked, — a convenience wanting to many sections and maps in the other coal chapters; and one (twenty-nine pages) by Mr. C. N. Brown on the Meigs-Creek coal of the upper coal-measures, very full in local details.

The practical utility of geological surveys is incidentally illustrated at several points in the volume, where it is shown that money, up to more than a million dollars in a single case, might have been saved by a good preliminary examination of the circumstances.

The world (if Ohio does not) must needs feel very grateful to Professor Orton and his assistants, some of them not contributors to the volume, for their largely gratuitous and very successful labors, and, congratulating him and them on having accomplished so much with such limited time and means, must hope that he may soon find himself able to publish at least one more volume on the several other economical subjects of high importance necessarily neglected this time.

THE WINDMILL AS A PRIME MOVER.

THIS treatise is intended to present the theory and the practice of construction and use of windmills, the history of this form of prime mover, its progress and development, and the economy attained in its application to the production of available power. It is a careful and conscientious study of the machines in use, of the theory of the transformation of the available energy of wind for purposes of application, and of the commercial aspect of the case.

Here will be found an account of the extent to which windmills are used, and of the comparative value of these forms of motor and the steam-engine, the theory of wind-pressure, and the effect of air in motion upon the sails. The history of the construction and use of windmills is given with a description of the best known. The whole is a very complete treatise, and will probably take its proper place as the standard, the only real treatise upon this subject. It supplies a want, and will probably be extensively read.

The arrangement of the book seems to us excellent, the treatment good, the work, so far as we have been able to check it, accurate, and the conclusions correct. Chapters ii. and ix. on the construction of the formulas for effect, and on the commercial economy of the mill, are the most strikingly valuable parts of the book; and the former will interest the student of the theory of prime movers as greatly as the latter will interest the proposed user of the machine, and the practising engineer. The text is well written, the book-making excellent,

The windmill as a prime mover. By ALFRED R. WOLFF, M.E., New York. Wiley, 1885. 8°.

and the whole book is an illustration of a kind of work which is always welcomed by the profession to which its author has presented it.

NOTES AND NEWS.

A LARGE stone slab has just been placed in the wall of the entrance hall of the newly completed portion of the Museum of comparative zoölogy, which was built by Dr. Alexander Agassiz at his own expense, and presented to Harvard college. The simple inscription reads as follows:—

LVDOVICI ▼
AGASSIZ ▼
PATRI ▼ FILIUS ▼
ALEXANDER ▼
MD ▼ CCC ▼ LXXX ▼

— On the last day of August, according to *Nature*, Professor Michel Eugene Chevreul entered upon his 100th year. Apart from the fact, that, among men whose lives have been devoted to active scientific research, no one has before attained such an age, Chevreul stands conspicuous for the vast amount of work he has done, and for the great practical effect his work has had on the industries of the world. When Dumas, in 1852, addressed him on the occasion of handing to him the prize of 12,000 francs accorded to him by the Société d'encouragement pour l'industrie nationale, he said, "Le prix consacre l'opinion de l'Europe sur des travaux servent de modèle à tous les chimistes; c'est par centaines des millions qu'il faudrait nombrer les produits qu'on doit à vos découvertes." More recently, in 1873, when the award of the Albert medal was made by the English society of arts, the terms in which the council expressed the grounds of the award were, "For his chemical researches, especially in reference to saponification, dyeing, agriculture, and natural history, which for more than half a century have exercised a wide influence on the industrial arts of the world." His scientific work, apart from its commercial outcome, was recognized by the Royal society of London as far back as 1826, when he was elected a foreign associate. In 1857 the Copley medal was awarded to him. Other countries have also paid him honor, while the distinctions of his native land have showered upon him. Born in Angers in 1786, where his father was a physician of note, he was but seventeen when he went to Paris to be 'manipulateur' in the laboratory of the celebrated Vanquelin. At the age of twenty he published his first chemical paper, and in the next half-dozen years he had published more than a score on different subjects. Then began that series of papers (commencing in 1813), "*Recherches chim-*

iques sur plusieurs corps gras, et particulièrement sur leurs combinaisons avec les alcalis," which extended for many years. In 1824 he was appointed professor of chemistry at the famed factory of Gobelins; and the energy and untiring industry which was one characteristic of his work, soon accumulated stores of knowledge based on experiment. To exact experiment he attached the highest importance. He wrote in 1823, "Experiment is not chemistry, facts alone do not constitute that science; but we cannot have discoveries without exact experiment." His '*Recherches sur la teinture*' is an elaborate work; and his '*Moyen de définir et nommer les couleurs*' occupies the whole of vol. xxxiii. of the *Mémoires* of the Institut. It has often been remarked, that it is difficult to believe that the Chevreul of 'corps gras' fame, and the Chevreul who wrote on colors, are one and the same man.

— *Science et Nature* announces the following scientific missions: The naturalist Frédéric Bordas is in charge of a zoological expedition to the islands of Mascareignes, Seychelles, and Comores. Clermont-Ganneau has undertaken an epigraphical expedition to the islands of the gulf of Akaba, in the Red Sea. Jacques de Morgan, civil and mining engineer, has gone to study the geology and mineralogy of the Free Orange States, — Transvaal, Zululand, and Natal. Lieut. Palat is exploring the route from Sénégal to Algeria by way of Medina, Timbuctoo, Mabrook, Touat, and Gourara. Benjamin Balarsa has charge of a scientific mission to Tonkin, and Jules Borelli is directing an expedition of the same kind at Choa. The intrepid explorer, Serpa Pinto, to whom the Société de géographie granted the gold medal five years ago, is dangerously ill at Hibo, Africa.

— The present year is one of the most successful that the Annisquam summer school of zoölogy has ever seen. Fifteen students have been at work at the tables, all, with one exception, studying the development and anatomy of marine types, and making collections for teaching purposes. The number of states represented is much greater than in any previous year, showing that the reputation of the laboratory is fast spreading. There are students from Massachusetts, Connecticut, New York, Pennsylvania, North Carolina, Tennessee, Indiana, Wisconsin, and Michigan. The laboratory is under the direction of Mr. B. H. Van Vleck, who is himself studying the development of the dog-fish.

— King Oscar II. of Sweden has announced that he will award a prize, on the 21st of January, 1889, the sixtieth anniversary of his birthday, for an important discovery in the field of higher mathematical analysis. The prize will consist of a gold medal having a value of a thousand francs, together with a sum of two thousand five hundred crowns (somewhat less than seven hundred dollars). The commission appointed by the king to determine the conditions of the competition and to judge the papers presented consists of Weierstrass of Berlin, Hermite of Paris, and Mittag-Leffler of Stockholm. They have designated four subjects for competition, the first relating to the motion of a system of particles attracting one another according to Newton's law, the second to a certain class of uniform functions of two variables analogous to hyperelliptic functions, the third to functions defined by differential equations of a certain type, and the fourth to Poincaré's Fuchsian functions. In case none of the memoirs presented on the four subjects named should be deemed worthy of the prize, it may be awarded to a memoir (sent in for competition) containing a complete solution of some other important problem in mechanics or the theory of functions. The exact particulars are set out in a circular letter issued by Professor Mittag-Leffler.

— Circular No. 20 of the division of entomology of the department of agriculture relates to the recently-established branch of economic ornithology, and consists of a statement of the subject to be investigated; namely, the inter-relation of birds and agriculture, and a series of questions calling for information respecting the food-habits of various species of birds, the nature and extent of their depredations, the reason of occurrence of the species, the number of broods raised in a season, the increase or decrease of particular species, etc. The circular, and also directions for the collection of birds' stomachs, will be furnished to all those willing to aid in the work, on application to Dr. C. Hart Merriam, ornithological agent, whose address will be Sing-Sing, N.Y., till Oct. 1; after this date, U.S. department of agriculture, Washington, D.C.

— The latest from Bering Strait brings news of the whaling fleet to July 12. At that date a hundred and ten whales had been taken by seven steamers and twenty-six barks. Three vessels were reported 'clean,' the remainder having from one to nine whales. The usual percentage of disasters are reported. Bark Napoleon, Capt. Smith, was crushed and foundered in lat. 58°, W. long. 177°, about the middle of Bering Sea, on the 5th of May. Her crew took to the boats; and, after a heavy gale four days later, two of these boats were rescued, several men having died of exposure, and the remainder missing, making a total loss of twenty officers and men. Bark Gazelle was stove by a pointed tongue of ice June 3, twenty-five miles south-east from the south-west cape of St. Lawrence Island. The damage was done so quietly that the first intimation had of it was the report of the mate that the hold was full of water. Three hours later she sank; the boats reached the island or other whalers in safety, and were kindly cared for by Capt. Marvin, McGregor and Hayes of the Arnolda, Abram Barker, and Hamilton. The steamer Balaena was badly stove, but was subsequently repaired by the master, and continued her voyage, which bids fair to be a good one, as she was reported with eight whales. The catch is unusually good for the time of the year to which we have reports, and an equal average to Oct. 1 will make a very prosperous season. Whalebone to the value of \$150,000 was brought down by the schooner Garfield, mail-carrier and tender to the fleet. Some of the vessels got into the Arctic by the east shore before the whales did, and got nothing; while the vessels south of the strait were killing. On June 10

the whales began to pass the strait; and on the 19th fifteen were struck by the Balaena and Alliance, of which thirteen were saved.

—The Hydrographic office has just issued a pamphlet (No. 77) entitled 'Practical hints in relation to West-Indian hurricanes,' being a translation by Lieut. Dyer of certain conclusions given by Padre Viñes of Havana, 'Apuntes relativos a los huracanes de las Antillas.' It includes a concise description of the weather preceding a hurricane, laying especial weight on the rise of the barometer, and the consequent anti-cyclonic winds outside of the cyclonic circulation; of the first appearance of the storm-clouds and winds, and the means of determining the bearing of the centre; of the tracks usually followed by these cyclones, and of the best means of escaping them. In speaking of the direction of the wind in the storm, a little fuller statement would seem necessary to avoid danger of being misunderstood. For example, it is said (p. 8), "As a rule, the lower currents converge, forming with the bearing of the storm-centre a variable angle, which is almost always greater than a right angle." By the use of the word 'converge,' the reader at once is led to consider the direction in which the lower winds are blowing spirally around the storm-centre; but, when looking in this direction, the angle between the wind and the storm-radius will be generally *less* than a right angle. Again: the table on p. 9 states, 'If the nimbus clouds and squalls move N., the centre will bear E.,' etc.; this surely ought to be 'move *from* the N.' It is well that the excellent work done by Viñes is thus in part brought before our naval officers; for, although it is some years since his conclusions were translated in Ferrel's 'Meteorological researches for the use of the coast pilot' in the coast-survey reports, we fear that some of our lieutenants have failed to read them.

—Among recent deaths we note the following: Professor Fleming Jenkin of the University of Edinburgh, June 12, in his fifty-third year; George Witz, chemist, at Rouen, June 17, in his forty-ninth year; Prof. A. W. Eklund, at Lund, Sweden, in his ninety-first year; and Dr. T. Clausen of the Dorpat observatory, May 25, in his eighty-fifth year.

—Prof. John Le Conte of California prints in the *Overland monthly* for August, 1885, an excellent argument in favor of the employment of the metric system.

—The *museum*, formerly published at Philadelphia, has been merged with the *American antiquarian*, published at Clinton, Wis. The *young mineralogist and antiquarian* has been suspended.

—The title of Rieger and Toppel's pamphlet (*Experimentelle untersuchungen über die willensthätigkeit*. Jena, Fischer, 1885. 48 p. 8°) is rather too pretentious for its content. The activity of the will, studied by the authors, is the holding out of the hand, as steadily as possible, for two minutes. The hand is found to waver slightly, and usually to sink somewhat without the subject becoming aware of the change. Dr. Rieger described his method of tracing its motions in his former book on hypnotism. The

patient holds a pin between his fingers. The pin's shadow is cast on the drum of a chronograph, where some one keeps a pencil-point upon its head whilst the drum revolves. Nine plates give specimens of the many curves thus obtained. Either phlegmatic stolidity, or normal strength of will, makes them level and regular. Hysteric mobility makes them irregular. Dementia may make the line sink very rapidly. In certain states of cerebral irritation with tendency to contraction of the flexors, the line rises instead of sinking. Tremor and hemiplegia give vibrating curves. The administration of amylnitrite acts differently in different persons. Usually, however, it makes the curve worse. This is especially the case in delirium tremens. Many a mickle makes a muckle; and, out of such small facts as these, something worth knowing about voluntary activity may some day be inferred. What Dr. Toppel has to say of the influence of amylnitrite on the brain-circulation, will be found worth reading by those whom it concerns.

—It is rare, indeed, that a scientific article prepared nearly forty years before, and familiar by copious extracts, merits publication in full as still the best work in its own special field. Yet few will contest that such is the case with Mr. Aubin's celebrated essay on "La peinture didactique et l'écriture figurative des anciens Mexicains." All students of the subject are familiar with the remarkable results which he reached; but the full evidence of his statements, his proofs, in other words, that the Aztec hieroglyphic writing is, in a measure, phonetic, has never been submitted. In spite of the productive labors in the same field of the late Señor Ramirez, we find, in several of the most recent authoritative works on Mexico, the phonetic character of the ancient writing wholly denied. Now, however, the French government has published Mr. Aubin's essay complete, revised by the venerable author himself, and edited by the competent conservator of the museum of the Trocadéro, Dr. Hamy. Five beautifully executed chromo-lithographic reproductions of Mexican codices accompany the essay, and serve as undeniable testimony to the accuracy of the author's rendering of the text, as they contain a translation in Nahuatl of the figures. It cannot be said that the publication develops the theory to any further extent than did the original article in 1849; but the evidence on which it rests is for the first time submitted in a form satisfactory to students. The publication is one of the issues of the "Mission scientifique au Mexique et dans l'Amérique Centrale."

—Bulletin No. 1, new series, of the New-York agricultural experiment station, contains an analysis and valuation of 'Mason's high-grade potash fertilizer,' manufactured in Binghamton, N. Y., showing it to be an unmitigated swindle; a ton of it being worth, according to the station's liberal estimates, about a dollar and a half, while the selling-price is thirty dollars. The reprint of the manufacturer's circular, which makes part of the bulletin, is one of the best specimens of pseudo-science which it has lately been our fortune to meet.